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pages of specification

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Doc Code: Artifact

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Artifact Type Code: S

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Artifact Type Code: U

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Stapled Set(s) Color Documents or B/W Photographs

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Video tape(s)

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Model(s)

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Bound Document(s)

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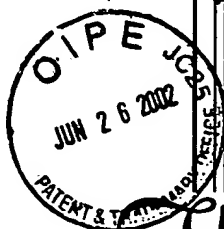
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Other, description: _____

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The United States of America



The Commissioner of Patents and Trademarks

Has received an application for a patent for a new and useful invention. The title and description of the invention are enclosed. The requirements of law have been complied with, and it has been determined that a patent on the invention shall be granted under the law.

Therefore, this

United States Patent

Grants to the person(s) having title to this patent the right to exclude others from making, using, offering for sale, or selling the invention throughout the United States of America or importing the invention into the United States of America for the term set forth below, subject to the payment of maintenance fees as provided by law.

If this application was filed prior to June 8, 1995, the term of this patent is the longer of seventeen years from the date of grant of this patent or twenty years from the earliest effective U.S. filing date of the application, subject to any statutory extension.

If this application was filed on or after June 8, 1995, the term of this patent is twenty years from the U.S. filing date, subject to any statutory extension. If the application contains a specific reference to an earlier filed application or applications under 35 U.S.C. 120, 121 or 365(c), the term of the patent is twenty years from the date on which the earliest application was filed, subject to any statutory extension.

J. Todd Pichini

Acting Commissioner of Patents and Trademarks

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GROUP 3600



US005907395A

United States Patent [19]

Schulz et al.

[11] Patent Number: 5,907,395

[45] Date of Patent: May 25, 1999

[54] OPTICAL FIBER PROBE FOR POSITION MEASUREMENT

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[21] Appl. No.: 08/870,296

[22] Filed: Jun. 6, 1997

[51] Int. Cl.⁶ G01B 11/26; A61B 19/00

[52] U.S. Cl. 356/139.03; 356/141.5;
356/375; 600/476; 606/130

[58] Field of Search 356/139.03, 141.3,
356/141.5, 375; 600/476; 606/130

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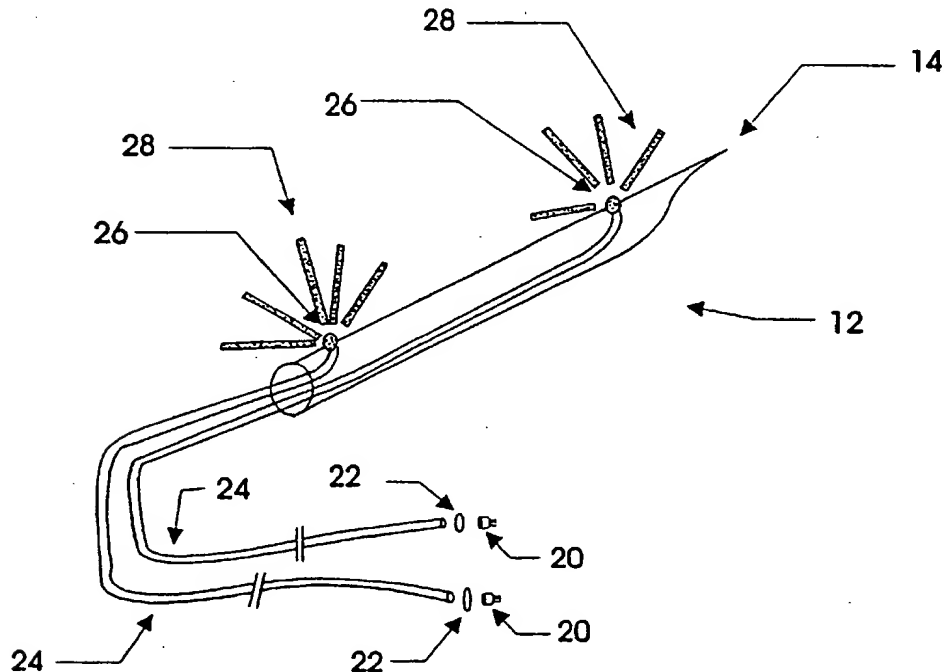
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Gilman & Berner

[57] ABSTRACT

Improved point source electromagnetic radiation emitters including a dispersing element that radiates electromagnetic radiation over a very wide conical angle of approaching about 180°. This light dispersing element can be in any one or more of several illustrated forms such as a light diffusing spherical or hemispherical element, a planar diffusing plate, a tapered light guide, a plano-concave lens, a convex mirror, a light pipe with a large numerical aperture, or the like. The emitter of this invention may be fixed to an object and tracked in a 3-dimensional volume by a system using electro-optical position sensors in order to determine the spatial location of the emitters and therefore to determine, by geometry, the position and orientation of the object. The electromagnetic radiation generator is preferably disposed remote from the emitter and is electrically and magnetically isolated from the emitter. A common optical fiber provides transmission of the radiation from the generator to the emitter. The emitted radiation more nearly resembles point source of radiation and therefore enables more accurate determination of the location of the radiating element, and thereby more accurate determination of the position and orientation of the object on which the emitters reside. The preferred electromagnetic radiation generator is an LED, most preferably a laser diode.

48 Claims, 5 Drawing Sheets



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